

An Approach to IP Telephony Implementations

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1. Introduction

This paper will illustrate Getronics' life cycle approach to an organizations' converged network using the Cisco IP Telephony architecture. It will explain Cisco's IP Telephony product and its specialized tools and processes that Getronics can deliver to customers to make the vision of "one-stop networking" a reality.

In the current networking environment, voice is data. IP telephony combines different types of communications—such as data, voice, and video—over a single packet-based infrastructure. By combining multiple types of traffic on a single network connection, businesses can dramatically reduce the cost of their voice and data networks through convergence. By merging the voice and data networks, businesses can take advantage of evolving business applications such as:

- Messaging
- Voice-enabled desktop applications
- Internet telephony
- Desktop video (Intel ProShare, Microsoft NetMeeting, etc.).

This document describes the methodology and best practices for deploying a native IP-based voice, data and video communications system, based on the Getronics NetWorkPlace Framework. An IP based communications system can replace legacy systems, while continuing to support all the call processing, voice messaging, management and administrative features currently in use. In addition, IP communication systems are capable of quickly adapting to changes and growth.

2. IP Telephony Overview

2.1 Cisco Value Proposition

Essentially, Cisco offers key infrastructure and software components that fit within its standards-based, IP Telephony product line. Cisco IP Telephony is based on three distinct building blocks: "infrastructure", such as switches and routers, "applications", such as call control and unified messaging, and "clients", such as fixed and wireless IP telephones, H.323 standards based videoconferencing equipment, and PCs.

With Cisco IP Telephony in place, users will be able to rapidly deploy best-of-breed IP-based business applications from a range of vendors, and smoothly converge its business practices onto a standards-based, open architecture to stay ahead of its competition. IP Telephony is a completely converged architecture and utilizes internet-based distributed technologies. The system can currently scale to over 100,000 users.

Most enterprises currently have a robust IP data network. The installation of a few key components will provide a truly converged solution that will increase productivity, simplify network administration and reduce overall IT costs. The solution components include Cisco CallManager software, Media Convergence Servers, Cisco IP telephones, and a choice of intelligent gateways.

Because Cisco's IP Telephony is built around an IP-enabled intelligent network capable of providing voice and video across both the LAN and WAN, the IP Telephony solution provides a level of redundancy that does not exist in the PBX world. For example, with IP Telephony, if the Call Manager in one location fails, traffic can be automatically rerouted through other Call Manager(s) located within the enterprise without any impact to the user(s). If a PBX fails, you cannot utilize the services of the PBXs at other locations to reroute the traffic. Since all IP Telephony applications reside on the firm's network infrastructure, it can be deployed and maintained from any location on the network.

The Voice over IP, Frame Relay, and ATM solutions that Cisco provides have been in production use for over 4 years. With many enhancements to voice compression and different forms of Quality of Service (QOS), this solution has evolved into a very dynamic and cost effective approach for enterprise customers through the convergence of voice and video traffic onto one network.

Unlike other solutions, Cisco IP Telephony is built around an intelligent, IP-enabled network that can guarantee voice quality across both the LAN and WAN using industry standards such as DHCP, 802.1p and q, H.323, and IP Class of and Type of Service settings. In addition, the Cisco solution is the only one with the ability to connect both a PC and phone to a single CAT 5 drop at each location through the use of an integrated 10/100 Ethernet switch port on the back of Cisco IP phones.

2.2 Getronics Value Proposition

Getronics has the experience to successfully manage and complete all types and sizes of telecommunications and network projects. We have the expertise and resources necessary to be successful in both local and international projects. By adapting a best of breed paradigm, Getronics' Advanced Networks group provides services and solutions that ensure superior technology and reliability by combining our expertise with the leading hardware and software from our partners. As the single point of management and accountability, we work with our customers and our technology partners to determine, define and design the optimal network environment to meet the customers IT requirements and business objectives.

A key element of the Advanced Networks suite of services is Getronics' Gold Certified partnership with global technology leader Cisco Systems. As a Cisco-approved global systems integrator and professional services partner, we are fully qualified to deliver

advanced networking solutions that capitalize on Cisco's most advanced convergent voice, data and video applications.

We provide a single-source solution for service providers and commercial enterprises looking to deploy Internet telephony and other IP-based voice services. We support everything from defining and developing a solution to integrating and managing the project to network monitoring and maintenance. Our customers gain the advantage of our experience designing, deploying, using and maintaining VoIP solutions.

2.3 Getronics' NetWorkPlace Framework

Getronics' NetWorkPlace service offering is a unique approach to delivering an end-to-end IP Telephony network infrastructure solution. NetWorkPlace combines a full complement of analytically based assessment studies, deployment, and managed services--all delivered through best practices by certified consultants and service professionals. Our goal is to create an infrastructure that is both cost effective and a strategic and scalable corporate asset.

With Getronics' NetWorkPlace service offerings, our customers have a reliable technology partner with clearly defined programs to strategically evaluate, support and manage both the network and desktop environments. By putting the customer in control of their strategic assests, we help them increase system functionality and reliability while improving user satisfaction – all with less risk. Technology is not simply an asset, it becomes a strategic advantage – an infrastructure that is adaptable, giving our customers the strength and flexibility to fully embrace next-generation e-business applications. These applications provide two benefits: IT scalability, and the ability to rapidly integrate next generation services for itself, its partners, and, most importantly, its customers.

NetWorkPlace is an integrated suite of services covering the complete technology lifecycle of planning, deployment, management and maintenance. In addition, by breaking out services into three main categories, each with a defined set of services, customers can focus on the specific needs of their organization.

2.4 Applying IP Telephony into NetWorkPlace

Getronics has applied the NetWorkPlace framework to the IP Telephony services that we can supply to our customers. The following sections provide specific detail in each of the Planning, Deployment, and Management and Maintenance phases of an IP Telephony roll-out.

3. Planning an IP Telephony Deployment

Proper planning of the IP Telephony deployment can insure a smooth transition to an integrated voice and data network. By completing each task below, the customer can be assured of a successful implementation appropriate to their needs.

3.1 Business Requirements Analysis

Prior to any decision on strategy, the customer's requirements for voice services must be clearly defined. Getronics will evaluate the current environment and practices, and then recommend strategic infrastructure decisions aligned with the customer's business needs.

For an IP Telephony infrastructure, this would include items such as:

- Call services
- Phone features
- Call conferencing services
- Messaging
- Toll bypass
- Directory services.

Analysis of the client's current business model and how it is supported by the voice and data infrastructure will establish a baseline that will be used to measure the success of the IP Telephony implementation.

3.2 Network Infrastructure Assessment

Getronics will evaluate the design, performance and security of the existing network to ensure that it is capable of supporting an IP Telephony infrastructure, and identify any areas where enhancements are necessary. In order to successfully deploy IP Telephony services, a minimum number of system features must be available in a customers network. For instance:

- Networks where IP Telephony is to be deployed should be structured on a 3-tier model: Core, Distribution and Access, to ensure an even flow of traffic. A poorly structured design can create unnecessary bottlenecks, impacting performance.
- User Access nodes must be switch based technology, to provide the bandwidth to the desktop that can best support voice and video.
- User Access nodes should support multiple virtual LANs (VLANs) within a single switch. This way, voice and data can be configured separately and efficiently, while sharing the same physical infrastructure.
- The switch must provide 802.1q trunking on user connections, also to allow voice and data traffic to be configured separately.

- The switch must be able to provide differentiated Quality of Service (QoS) on a user connection. If the switch does not support 802.1q trunking and differentiated QoS on each user connection, the IP Telephony system may still be deployed but a separate connection would be required for the phone and data equipment connections.

3.3 Total Cost of Ownership analysis

The total cost and savings of an IP Telephony infrastructure should be identified and compared to the current costs. Getronics will examine the infrastructure costs and provide advice on how to invest to maximize the efficiency of the network. Items included in this analysis will include:

- Hardware
- Software
- Network /leased lines
- Support services.
- Value recovered from Cisco telephony trade in program

3.4 Network Design and Consulting

Getronics Advanced Networking group can provide consulting services to determine the best approach to implementing an IP Telephony system. Steps to determine an IP Telephony implementation plan include:

- A network equipment inventory of the IP Telephony implementations sites.
- A network diagram of existing VLANs and the logical LAN group served on each VLAN.
- An inventory of all voice systems the IP Telephony implementation is going to be integrated with or replace.
- A detailed configuration listing for equipment that must be ordered to support the IP Telephony implementation.
- The Compilation of an inventory of all existing WAN circuits that will be used to connect the IP Telephony implementation sites, and calculate the additional WAN bandwidth that will be required.
- Compile a review of existing and required security measures.
- Develop a plan to make any required changes to modify the network and/or upgrade equipment to achieve a voice capable 3-tier model.

These steps will be completed and collated into a design document, outlining all the steps necessary for a successful IP Telephony implementation.

4. Deploying IP Telephony

Once the planning of the IP Telephony infrastructure is complete, the deployment can proceed in an organized and logical manner. Getronics' Project manager will interface with the customer's designated Project Manager to develop the project timeline, and schedule equipment delivery, deployment, and training activities.

4.1 Network Infrastructure Modification and Migration

For existing networks where the current network does not conform to the 3-tier model, or the existing hardware does not support the required services, the first step is to implement the plan formulated to redesign and/or upgrade equipment on the network.

4.2 System Modifications and Migrations

One or more VLANs must be added to the existing VLAN configuration at the site to accommodate the IP Telephony equipment. If a VLAN structure for data was not previously implemented at the site, it must be created, as specified in the design document.

4.3 IP Telephony System Installation Sequence

Once the infrastructure is ready to support IP Telephony, the actual deployment begins. The main steps are summarized below:

- Install IP Telephony CallManager Publisher server.
- Configuration of IP Telephony system parameters, calling gateways, dial plan and phone clients.
- Install IP Telephony CallManager Subscriber servers as needed.
- Install IP Telephony Voicemail Solution.
- Connect the IP Telephony system with minimal access to PSTN and tie line services.

4.4 Voice/Data System Migration

The most complex step in the deployment is the migration of users from the existing voice system onto the IP Telephony network. In addition to user education and training issues, this is the time when design assumptions will be tested. Careful monitoring of this phase can ease users transitions, as well as provide the opportunity to tweak system performance. Additional steps include:

- Migrate users to the IP Telephony system, and monitor for possible problems.
- Complete the connection of all PSTN and tie line services to the IP Telephony system.

- Conduct training for users and support personnel.
- De-commission and remove telephone equipment that is no longer needed.

4.5 Security System Deployment

An IP Telephony infrastructure, by nature, will have different security concerns than either a voice only or data only network. Careful balancing of security issues can produce an integrated network that meets the customers' security requirements.

4.6 Network Management System Deployment

IP Telephony deployments are not complete without the implementation of a network management system. The four main areas involved are hardware, software, network, and call data:

- Real time monitoring of all Core and Distribution nodes in the IP Telephony system should be implemented. Network monitoring products with the capabilities similar to HP OpenView should be in place before the IP Telephony system is placed in full production.
- Statistical monitoring of all WAN links used to carry IP telephone connections should be implemented. Concord Communications Network Health or other SNMP statistical data collection station may be used.
- Implement a strategy for monitoring the real time status of telephony resources in the IP Telephony system. Microsoft Performance monitor available in the WINDOWS 2000 installation of the CallManager, at a minimum, may be used. The system should monitor all calls active in the system and the number of calls being processed at each gateway.
- Monitoring of user calling patterns and billing information should be implemented. This data is collected in the Call Detail Records kept by the Call Manager.

5. Managing and Maintaining an IP Telephony Infrastructure

While the deployment of new systems is usually given full attention, the subsequent management and maintenance often does not receive adequate consideration. As part of the NetWorkplace framework, the ongoing operations of an IP Telephony infrastructure can be supported in a consistent and proactive manner.

5.1 Help Desk Service

Even in the best-designed systems, equipment failures and network outages will occur. Getronics can design and implement a monitoring system to be operated by the customer,

or the customer may choose to subscribe to Getronics' network management offering. The existing service desk at Getronics' Enterprise Service Center (ESC) in Houston (and Sydney and London) interacts with the Customers' network, disseminating status and other information back to the end users regardless of what type of outage. (WAN, LAN, server, and application).

5.2 Getronics' Network Management services Offering

Today Getronics provides a wide range of network managed services. Getronics provides reactive, proactive, and configuration management for routers, switches, hubs, servers, and other networked equipment for all the major vendors. Network management services also has back office staff supporting engineering design, recommendations, installation, and support for network equipment as well as Unix, Novell, and NT systems.

5.3 Security Management

Security management requires periodic assessment and validation of the customers' current environment, as well as identifying possible threats to the IP Telephony infrastructure.

5.4 System Management

Proactive management of the systems comprising the customer's IP Telephony deployment can provide valuable usage information, as well as avoid costly system failures. Getronics can monitor the performance of a customers' IP Telephony environment and notify the customer if service falls below target levels.

5.5 Equipment Maintenance

Getronics has a field service unit with the capability to perform moves, adds, and changes, and maintain network components from the core to the CPE. We will coordinate with the customer and vendors to ensure equipment is properly maintained. Hardware failures are restored to service, tracked and escalated to the responsible party.

5.6 Technology Upgrade or Refresh

Technology changes rapidly, especially in an emergent field such as IP Telephony. We provide recommendations back to our clients for many issues surrounding technology refresh. This provides our customers with the ability to make decisions with the knowledge that upgrade paths and developing technologies have been fully considered, ensuring a long, reliable lifecycle for the installed systems.

6. Summary

With data traffic fast outpacing the growth of voice, packet switched technologies dropping in price, and convergent network applications becoming available, migration to an IP Telephony infrastructure is a sound e-business strategy. With the help of Getronics services, customers can be assured of a smooth transition to IP Telephony.

Appendix A.

1. Sample Network Diagram

